

detecting means; and a system control means for performing various processes for error correction in predetermined procedures a necessary number of times.

In the system control means, a first-time error correction sub means  
5 reads data from the buffer memory in the same direction as calculation for  
an error detecting code as a first-time error correction; transfers the read  
data to the syndrome calculating means and to the error detecting means  
concurrently until the syndrome calculating means detects an  
error-containing code; makes the syndrome calculating means execute  
10 syndrome calculation and the error detecting means execute error detection  
in parallel; makes the error correcting means execute error correction when  
the syndrome calculating means has detected an error-containing code; and  
makes one or both of the syndrome calculating means and the error  
correcting means provide the system control means with information which  
15 designates a code word containing the error-containing code.

The even-numbered error correction sub means reads a code word in  
the different direction from a preceding odd-numbered error correction;  
transfers the code word to the syndrome calculating means and to the error  
detecting means concurrently until the syndrome calculating means detects  
20 an error-containing code; makes the syndrome calculating means execute  
syndrome calculation and the error detecting means execute error detection  
in parallel; makes the error correcting means execute error correction when  
the syndrome calculating means detects an error-containing code; and  
makes the error correcting means provide the system control means with  
25 information which designates the position of the error-containing code in

an error correcting code word obtained in the error correction.

The non-error range designating sub means designates, one sector at a time, a range from which an error-containing code has not been detected at the odd-numbered error correction or the subsequent even-numbered error correction, based on the information that designates the code word including the error-containing code and the information that designates the position of the error-containing code in the error correcting code word.

The odd-numbered error correction sub means, as an odd-numbered error correction in the third-time or later error correction, provides concurrently the syndrome calculating means and the error detecting means with a code in the same direction as in the previous odd-numbered error correction except for a sector in one ECC block which has been designated by the non-error range designating sub means as the range from which an error-containing code has not been detected in and before the preceding even-numbered error correction until the syndrome calculating means detects an error-containing code; makes the syndrome calculating means execute syndrome calculation and the error detecting means execute error detection in parallel, while using the processing results of sectors whose results in previous error detection and correction have been corrected; makes the error correcting means execute error correction when the syndrome calculating means detects an error-containing code; and makes one of the syndrome calculating means and the error correcting means provide the system control means with information which designates the code word including the error-containing code.

The number-of-times control sub means repeats the odd-numbered error correction and the even-numbered error correction a predetermined number of times.

In the aspect 8, the number-of-times control sub means repeats the error correction three times at most because it would be meaningless to repeat error correction more than three times under the developed technology in the recent years. If error correction were not to be complete in three times, data might be read again at different speed, or correction algorithm might be changed. In case of image data, which are not adversely affected by minor noises, might be transferred downstream as they are, or data at the same position in the preceding scene might be used instead. In other aspects, the same process will be done if error correction is not complete after several times of correction.

In the aspect 9, the error correction device of the aspect 7 or 8 further comprising a storing means for storing mid-term results, in code word units, of each code word from which no error has been detected in the error detecting process done by the error detecting means until the syndrome calculating means detects an error-containing code.

The non-error range designating sub means is a non-error sector code word range designating sub means for designating, in code word units of a sector, a range from which an error-containing code has not been detected in the odd-numbered error correction or the subsequent even-numbered error correction, based on the information that designates the code word including the error-containing code and on the information that designates the position of the error-containing code in the error correcting code word